

CLAIMS

What is Claimed is:

1. A field-effect transistor comprising:
 - a first compound semiconductor layer through which carriers travel;
 - 5 a second compound semiconductor layer for supplying carriers to the first compound semiconductor layer, said second compound semiconductor layer being formed on the first compound semiconductor layer;
 - a third compound semiconductor layer formed on the second compound semiconductor layer; and
 - 10 a gate electrode forming a Schottky junction with the third compound semiconductor layer, said gate electrode being formed on the third compound semiconductor layer,
 - wherein at least the upper part of the third compound semiconductor layer is made of indium gallium phosphate having a broken natural superlattice and a set thickness of a predetermined value or less.
- 15 2. The field-effect transistor of Claim 1, wherein
 - indium gallium phosphate placed in the third compound semiconductor layer has a thickness of 8nm or less.
3. The field-effect transistor of Claim 1, wherein
 - when the indium gallium phosphate is placed only in the upper part of the third
 - 20 compound semiconductor layer, the lower part of the third compound semiconductor layer is made of aluminum gallium arsenide.
4. The field-effect transistor of Claim 1, wherein
 - the second compound semiconductor layer is made of aluminum gallium arsenide.
5. The field-effect transistor of Claim 1, further comprising a protective film made of a
- 25 low-dielectric-constant material, said protective film being formed to cover the gate electrode on the third compound semiconductor layer.
6. The field-effect transistor of Claim 5, wherein

the low-dielectric-constant material is benzocyclobutene.

7. An integrated circuit device obtained by forming, on a substrate, a field-effect transistor and a passive element electrically connected to the field-effect transistor,

wherein the field-effect transistor comprises:

5 a first compound semiconductor layer through which carriers travel;

a second compound semiconductor layer for supplying carriers to the first compound semiconductor layer, said second compound semiconductor layer being formed on the first compound semiconductor layer;

10 a third compound semiconductor layer formed on the second compound semiconductor layer; and

a gate electrode forming a Schottky junction with the third compound semiconductor layer, said gate electrode being formed on the third compound semiconductor layer,

15 wherein at least the upper part of the third compound semiconductor layer is made of indium gallium phosphate having a broken natural superlattice and a set thickness of a predetermined value or less.

8. A switching circuit comprising a field-effect transistor including gate, drain and source electrodes, said drain and source electrodes serving as input and output terminals, and a resistive element connected at one end to the gate electrode and serving as a control terminal at the other end,

20 wherein the field-effect transistor comprises:

a first compound semiconductor layer through which carriers travel;

a second compound semiconductor layer for supplying carriers to the first compound semiconductor layer, said second compound semiconductor layer being formed on the first compound semiconductor layer;

25 a third compound semiconductor layer formed on the second compound semiconductor layer; and

a gate electrode forming a Schottky junction with the third compound semiconductor

layer, said gate electrode being formed on the third compound semiconductor layer,

wherein at least the upper part of the third compound semiconductor layer is made of indium gallium phosphate having a broken natural superlattice and a set thickness of a predetermined value or less.

- 5 9. A plurality of switching circuits each comprising: a field-effect transistor including gate, drain and source electrodes, said drain and source electrodes serving as input and output terminals; and a resistive element connected at one end to the gate electrode and serving as a control terminal at the other end, said plurality of switching circuits being electrically connected to one another,

10 wherein each field-effect transistor comprises:

a first compound semiconductor layer through which carriers travel;

a second compound semiconductor layer for supplying carriers to the first compound semiconductor layer, said second compound semiconductor layer being formed on the first compound semiconductor layer;

15 a third compound semiconductor layer formed on the second compound semiconductor layer; and

a gate electrode forming a Schottky junction with the third compound semiconductor layer, said gate electrode being formed on the third compound semiconductor layer,

20 wherein at least the upper part of the third compound semiconductor layer is made of indium gallium phosphate having a broken natural superlattice and a set thickness of a predetermined value or less.